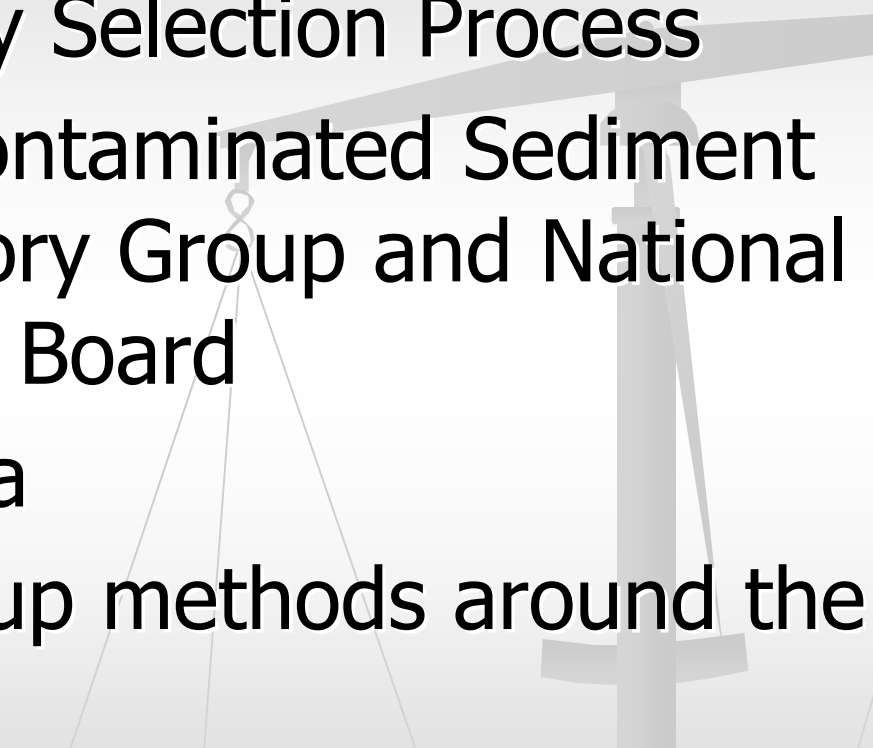


Selecting Remedies at Contaminated Sediment Sites Housatonic “Rest of River”



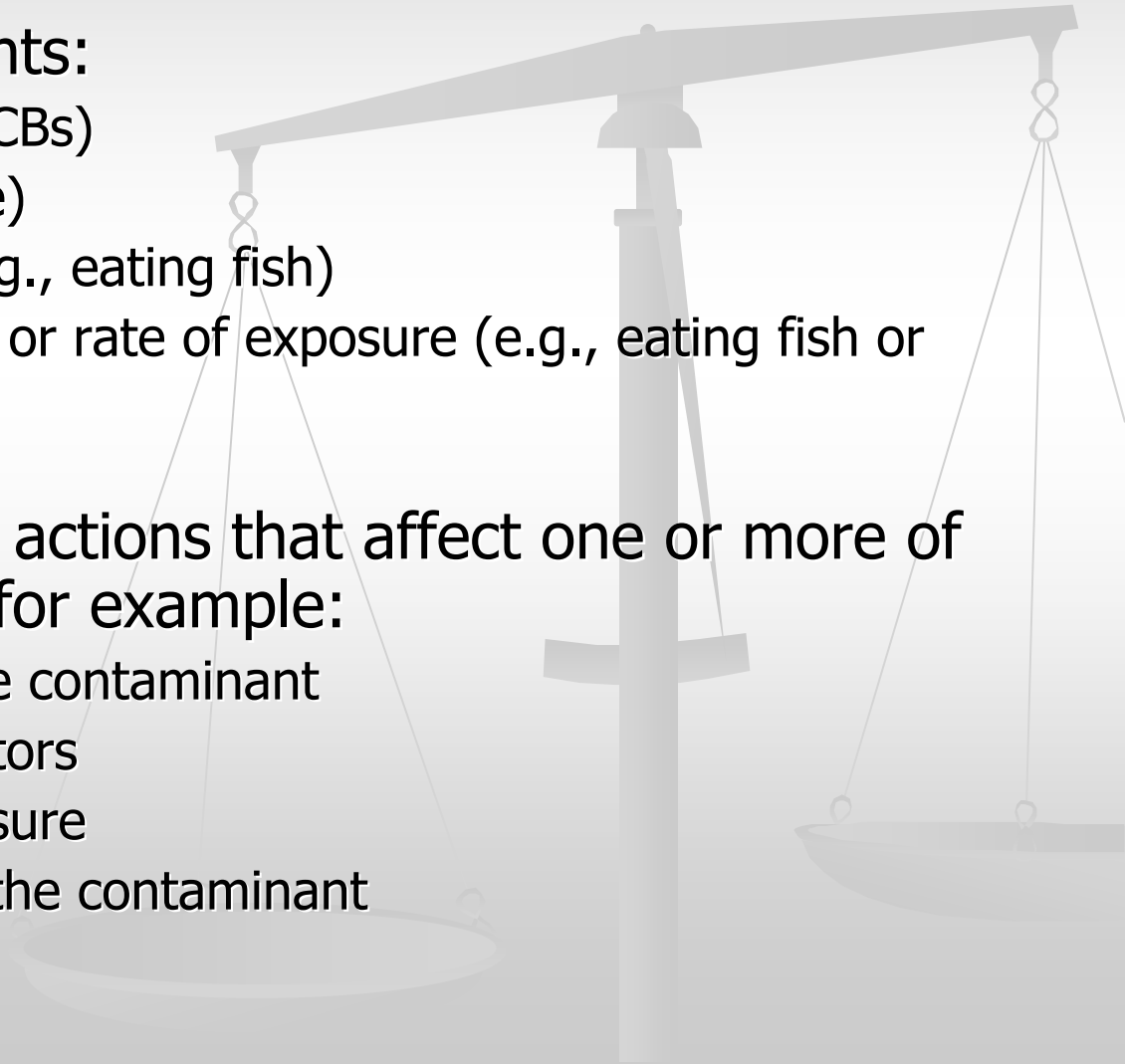
Randy Sturgeon, EPA Region 3
Contaminated Sediment Technical Advisory Group
Citizen's Coordinating Council Meeting
April 12, 2006

Outline

- Steps in Remedy Selection Process
 - Role of EPA's Contaminated Sediment Technical Advisory Group and National Remedy Review Board
 - Selection Criteria
 - Sediment Cleanup methods around the country
- 

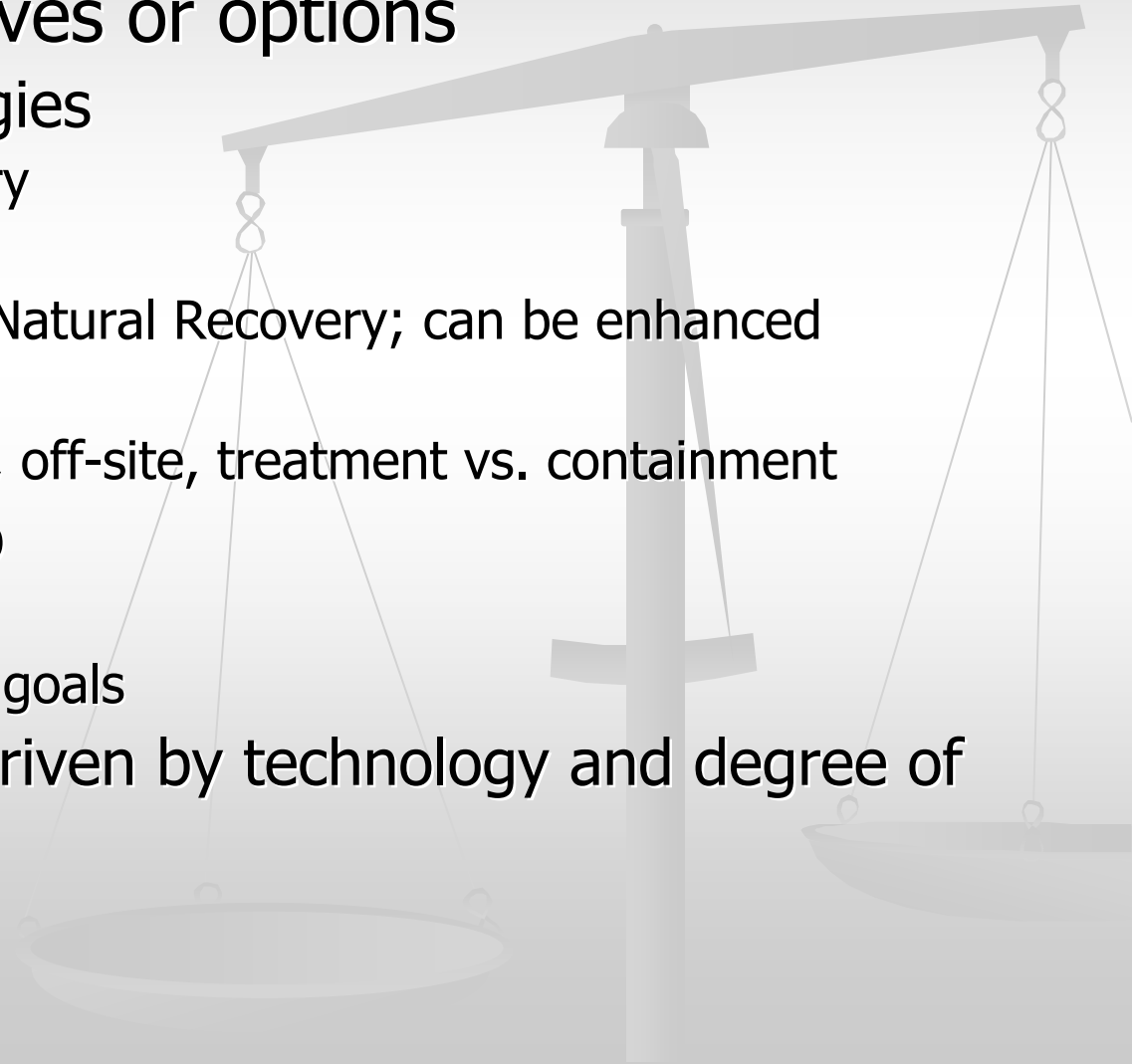
Risk and Reducing Risk

- What are some ways we may use to cleanup a site?
- For risk – four elements:
 - Toxic Contaminant (PCBs)
 - Receptor (e.g., people)
 - Route of exposure (e.g., eating fish)
 - Unacceptable amount or rate of exposure (e.g., eating fish or eating too much fish)
- To reduce risk – take actions that affect one or more of the above elements, for example:
 - Destroy or remove the contaminant
 - Modify types of receptors
 - Cut the route of exposure
 - Reduce the intake of the contaminant



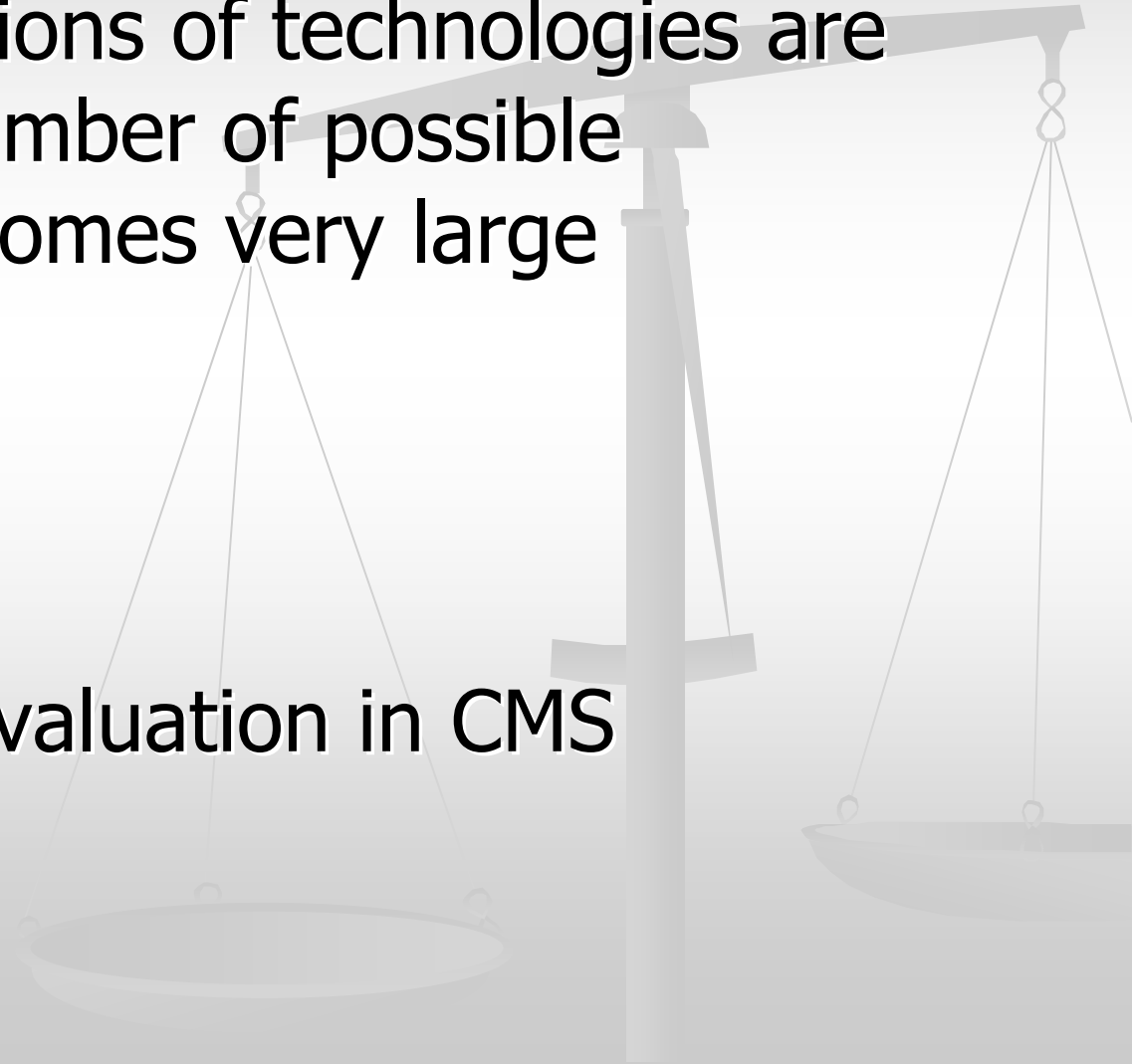
Corrective Measures Study

- Range of alternatives or options
 - Realistic technologies
 - Dredging – wet/dry
 - Capping
 - MNR: Monitored Natural Recovery; can be enhanced
 - Combinations
 - Disposal: On-site, off-site, treatment vs. containment
 - Degree of cleanup
 - Risk Range
 - Time to meet risk goals
 - Cost – generally driven by technology and degree of cleanup



Corrective Measures Study

- When combinations of technologies are possible, the number of possible alternatives becomes very large
- CMS Proposal
- Then detailed evaluation in CMS



Remedy Selection



- Generally, project managers should evaluate MNR, in-situ capping, and removal at every sediment site
- There is no presumptive remedy, regardless of contaminant or level of risk
- At large sites, consider how particular methods would best fit individual areas
- The focus should be on selecting the alternative best representing the overall risk reduction strategy for the site according to the remedy selection criteria

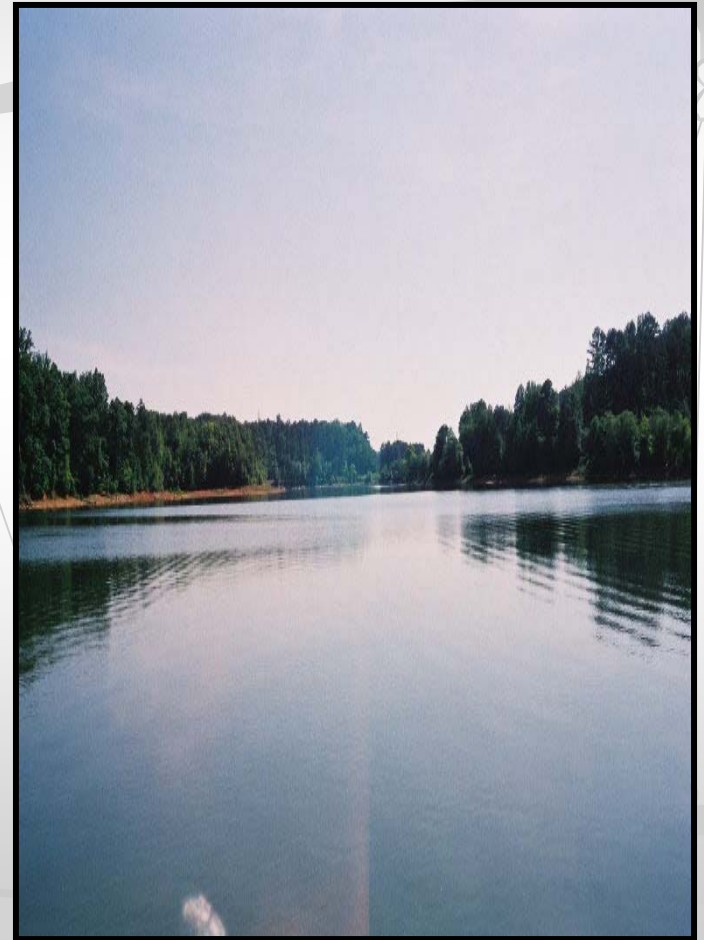
Monitored Natural Recovery

“MNR is a remedy for contaminated sediment that typically uses ongoing, naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediments... These processes may include physical, biological, and chemical mechanisms that act together to reduce the risk posed by the contaminants... As used for the purposes of this guidance, MNR is similar in some ways to the Monitored Natural Attenuation (MNA) remedy used for groundwater and soils... The key difference between MNA for groundwater and MNR for sediment is the type of processes most often being relied upon to reduce risk.”



Hierarchy of MNR Processes

1. The contaminant is converted to a less toxic form through **transformation** processes
2. Contaminant mobility and bioavailability are reduced through **sorption** or other binding processes
3. Exposure reduced by a contaminant decrease in near-surface sediment through **burial**
4. Exposure levels are reduced by a contaminant decrease in surface sediment through **dispersion, diffusion or advection**



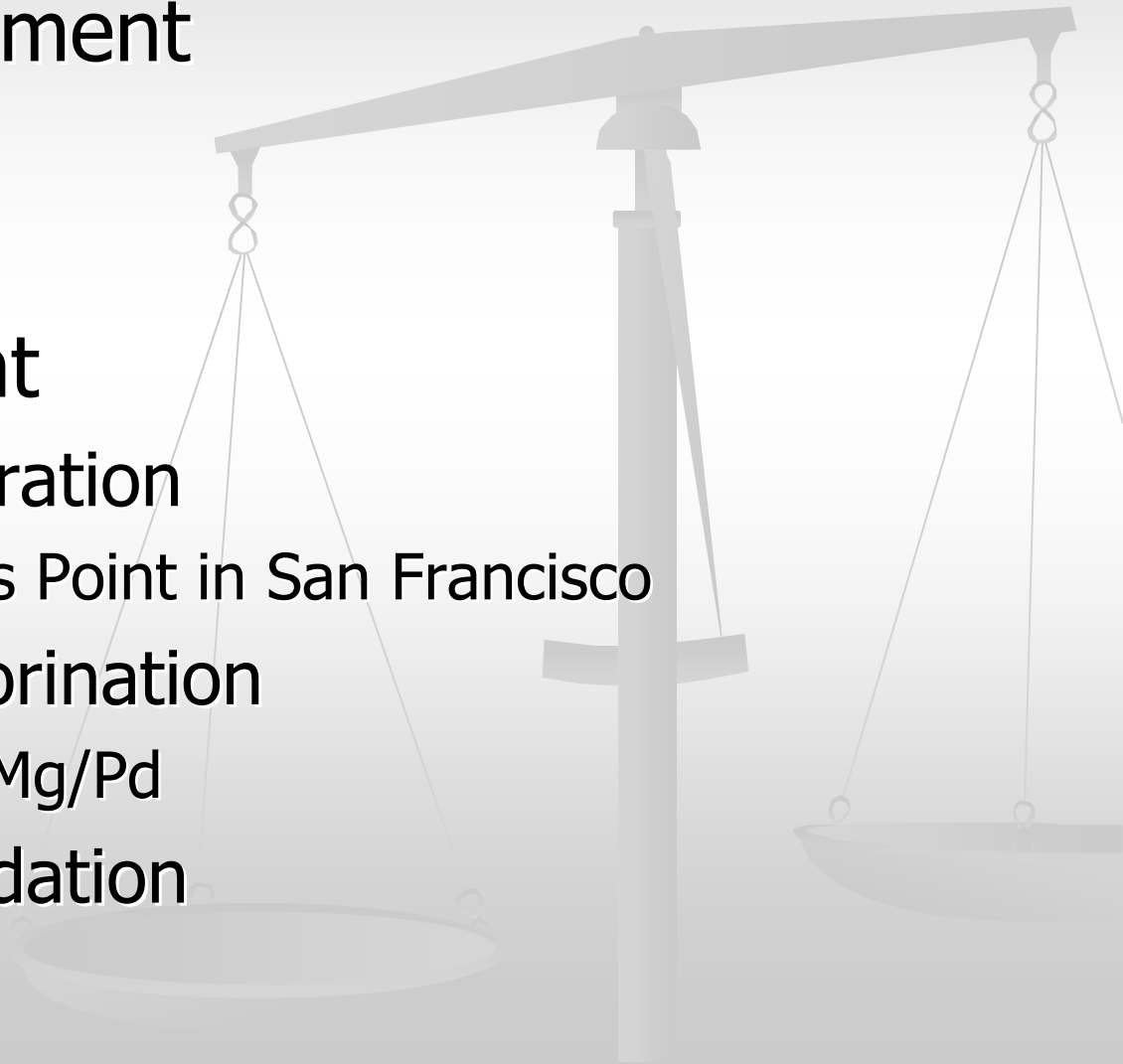
Potential Lines of Evidence of MNR

- Long-term decreasing trend of contaminant levels in higher trophic level biota
- Long-term decreasing trend of water column contaminant concentrations
- Sediment core data demonstrating a decreasing trend in historical surface contaminant concentrations
- Long-term decreasing trends of surface sediment contaminant concentration, toxicity, or contaminant mass



Enhanced Monitored Natural Recovery

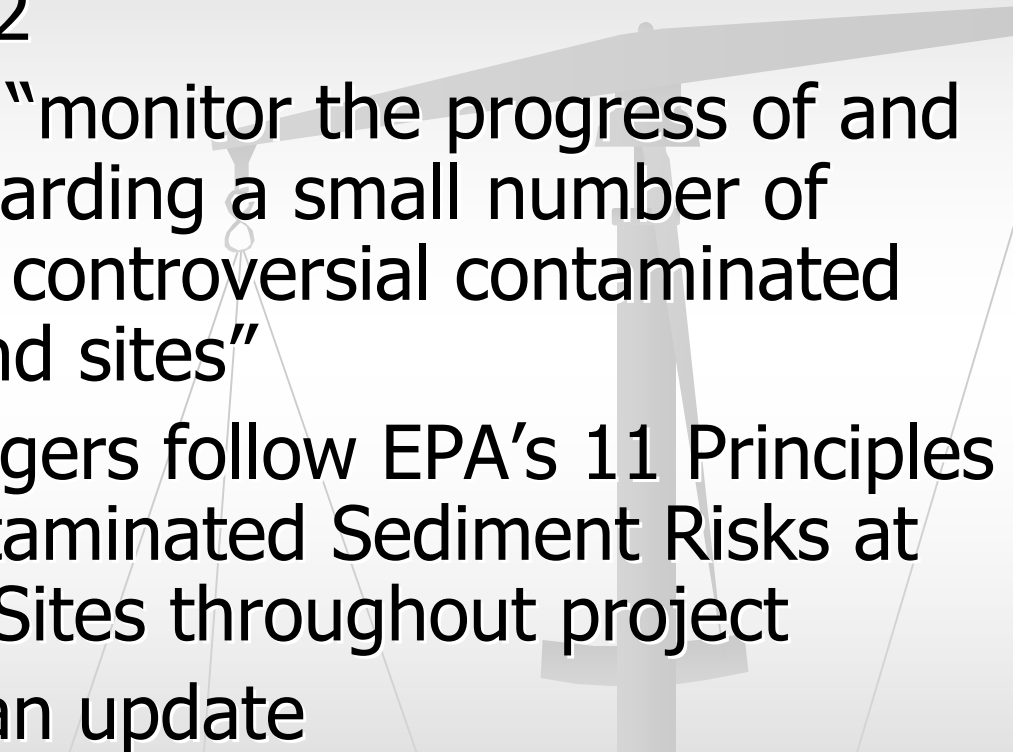
- Thin-layer placement
 - Sand
 - Clean sediment
- In-situ treatment
 - Carbon sequestration
 - Pilot at Hunter's Point in San Francisco
 - Chemical dechlorination
 - H_2O_2 , K_2MnO_4 , Mg/Pd
 - Microbial degradation



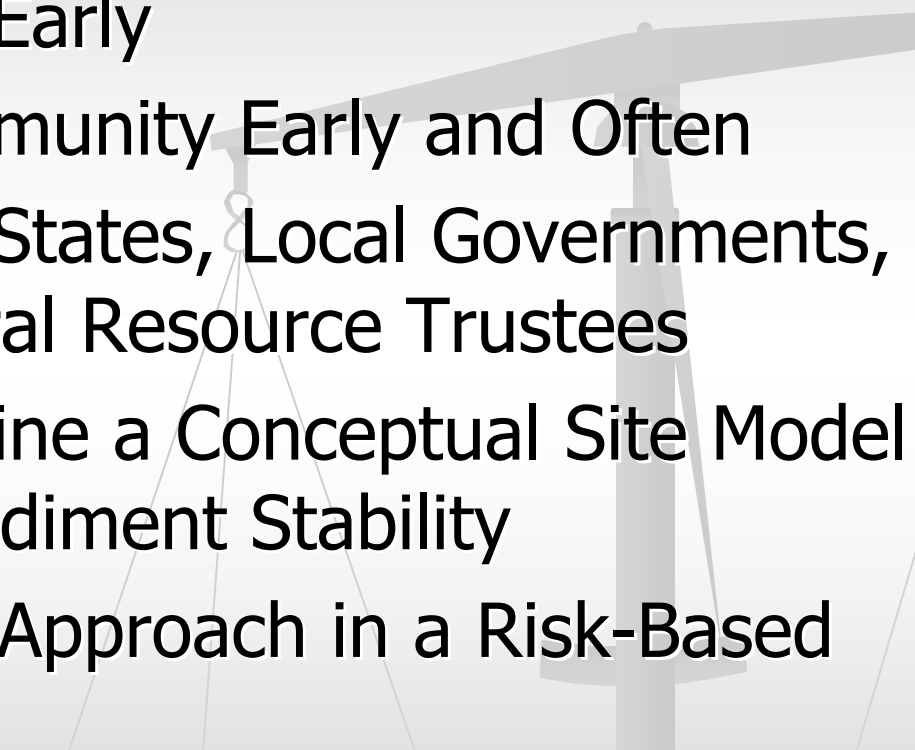
A faint, light gray background image of a balance scale is visible on the right side of the slide. The scale has a vertical central pillar, a horizontal beam at the top, and two pans hanging from the ends of the beam by thin wires. The scale is slightly tilted, with the right pan being higher than the left one.

Role of EPA's Contaminated Sediment Technical Advisory Group and National Remedy Review Board

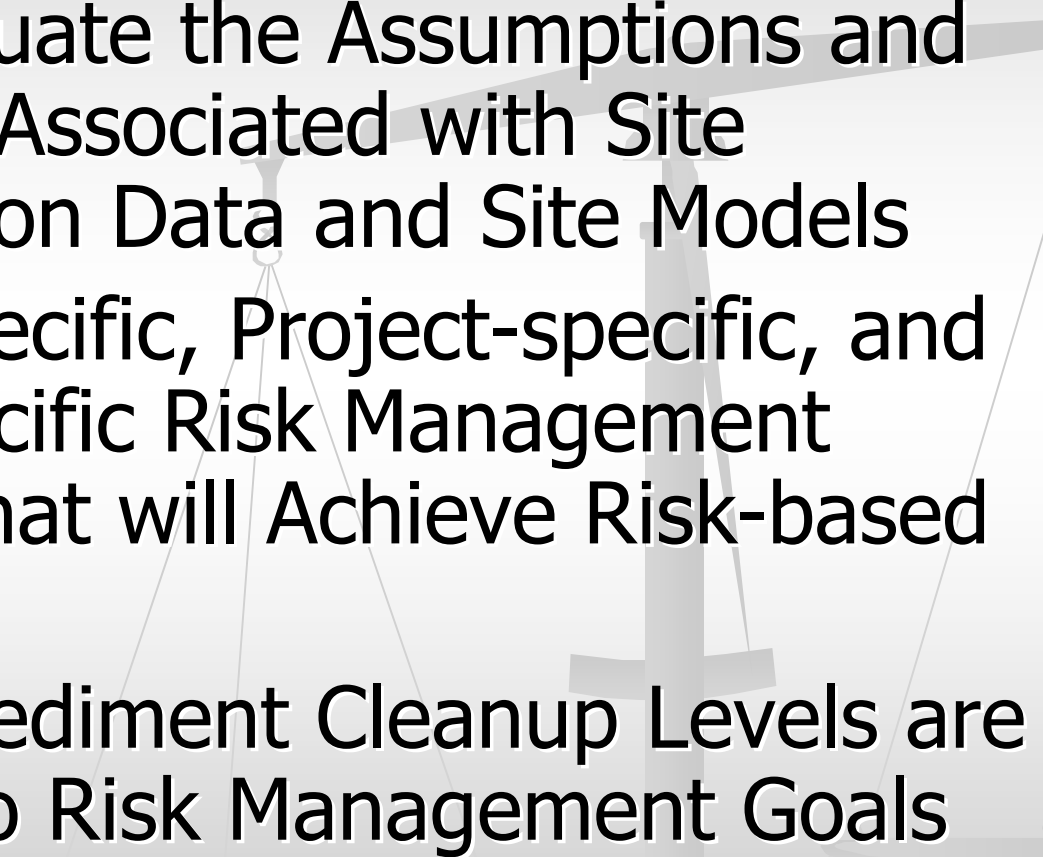
EPA's Contaminated Sediment Technical Advisory Group (CSTAG)

- Established in 2002
 - Advisory Group to “monitor the progress of and provide advice regarding a small number of large, complex, or controversial contaminated sediment Superfund sites”
 - Help project managers follow EPA's 11 Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites throughout project
 - Two reviews and an update
- 

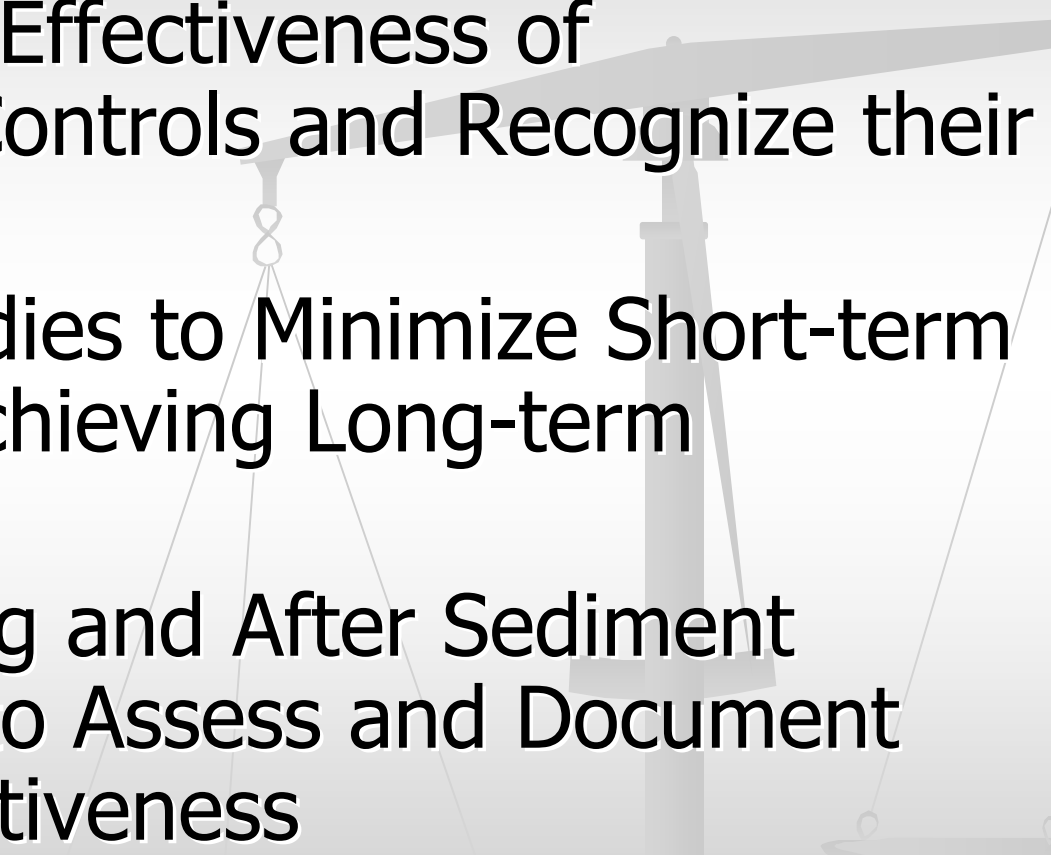
11 Sediment Management Principles

1. Control Sources Early
 2. Involve the Community Early and Often
 3. Coordinate with States, Local Governments, Tribes and Natural Resource Trustees
 4. Develop and Refine a Conceptual Site Model that Considers Sediment Stability
 5. Use an Iterative Approach in a Risk-Based Framework
- 

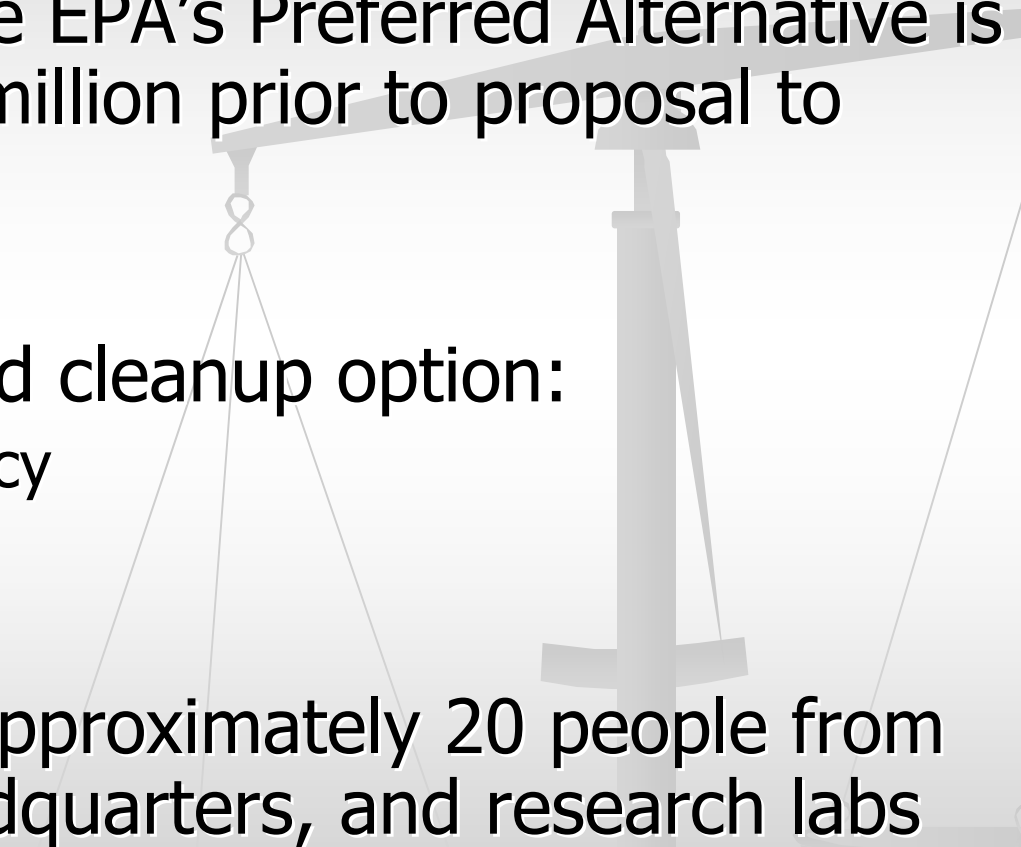
11 Sediment Management Principles

- 
- 6. Carefully Evaluate the Assumptions and Uncertainties Associated with Site Characterization Data and Site Models
 - 7. Select Site-specific, Project-specific, and Sediment-specific Risk Management Approaches that will Achieve Risk-based Goals
 - 8. Ensure that Sediment Cleanup Levels are Clearly Tied to Risk Management Goals

11 Sediment Management Principles

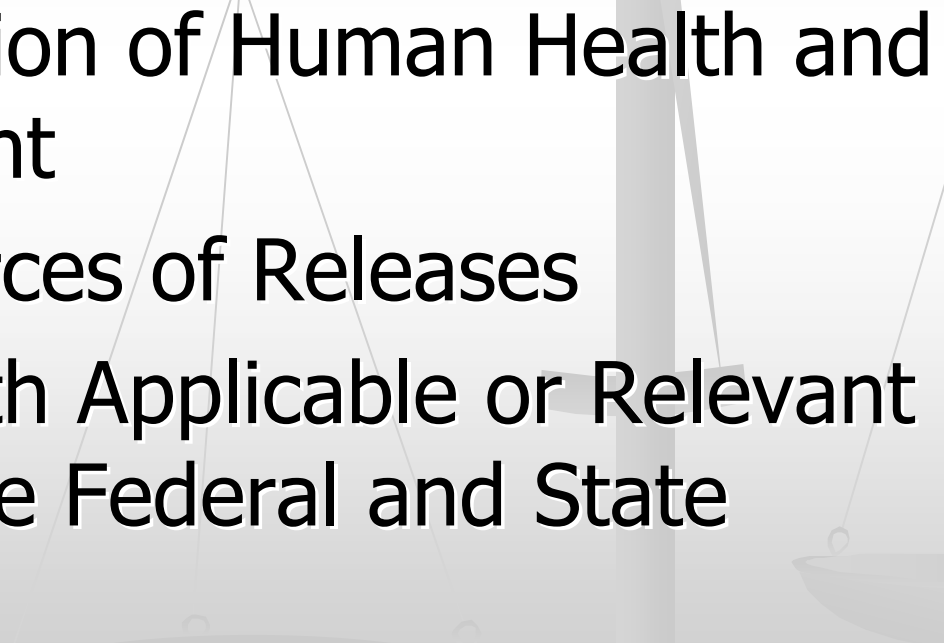
- 
9. Maximize the Effectiveness of Institutional Controls and Recognize their Limitations
 10. Design Remedies to Minimize Short-term Risks while Achieving Long-term Protection
 11. Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness

EPA's National Remedy Review Board

- Review sites where EPA's Preferred Alternative is greater than \$25 million prior to proposal to public
 - Evaluates preferred cleanup option:
 - National consistency
 - Cost-effectiveness
 - Formed in 1995, approximately 20 people from EPA Regions, Headquarters, and research labs
- 

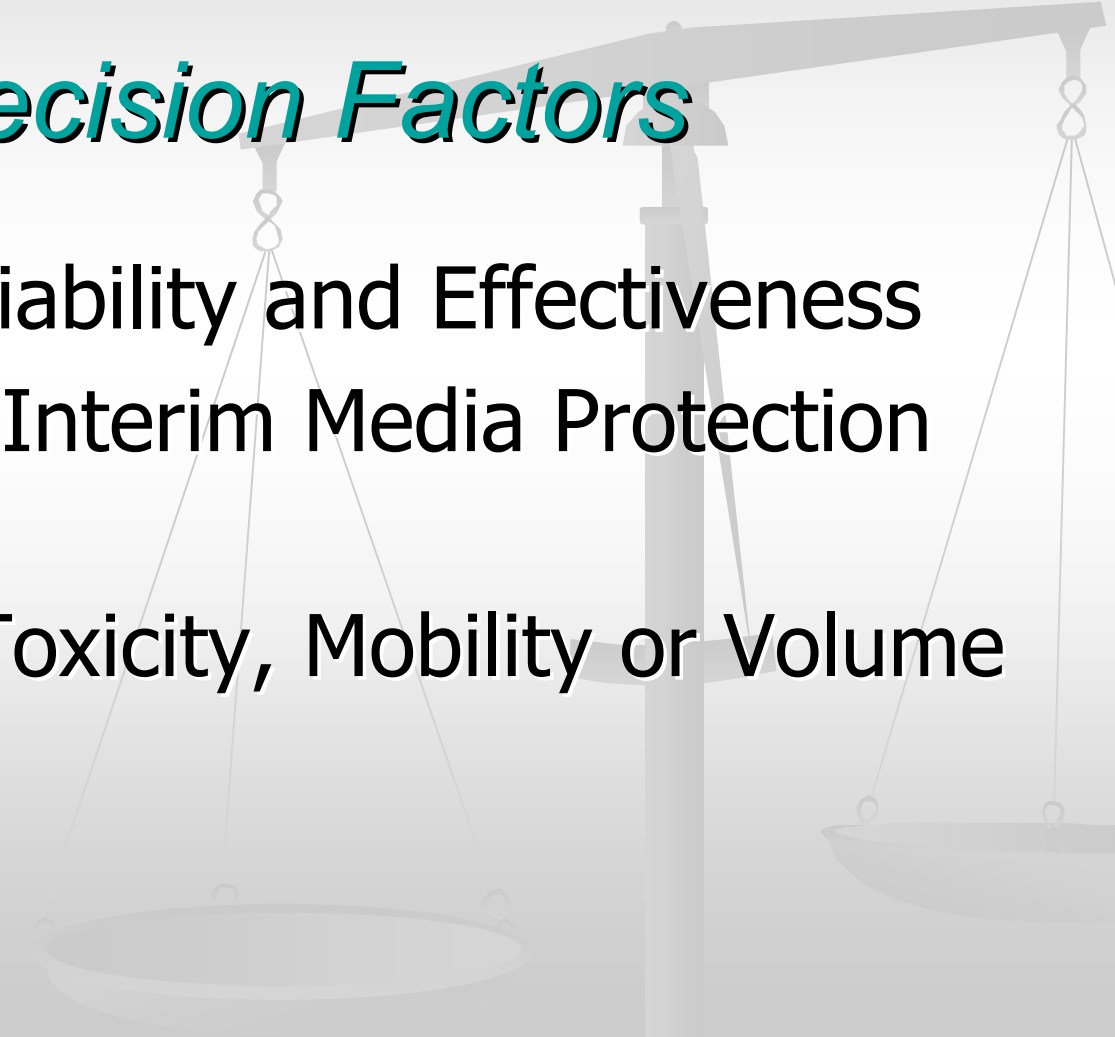
Selection Criteria (Appendix G of Consent Decree)

General Standards for Corrective Measures

1. Overall Protection of Human Health and the Environment
 2. Control of Sources of Releases
 3. Compliance with Applicable or Relevant and Appropriate Federal and State Requirements
- 

Selection Criteria (Appendix G of Consent Decree)

Selection Decision Factors

- 
- 4. Long-term Reliability and Effectiveness
 - 5. Attainment of Interim Media Protection Goals
 - 6. Reduction of Toxicity, Mobility or Volume of Wastes

Selection Criteria (Appendix G of Consent Decree)

Selection Decision Factors

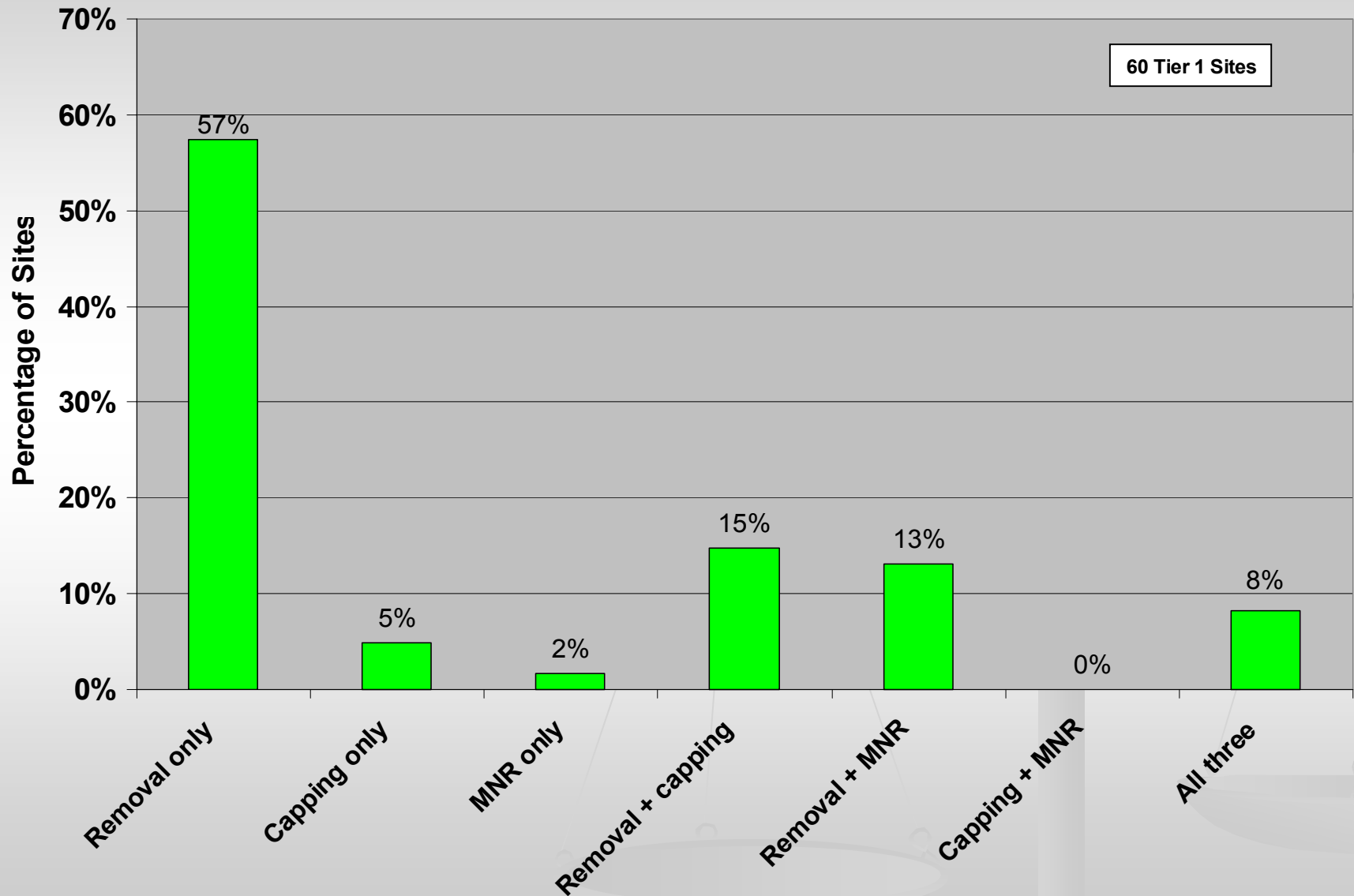
- 7. Short-term Effectiveness
- 8. Implementability
- 9. Cost



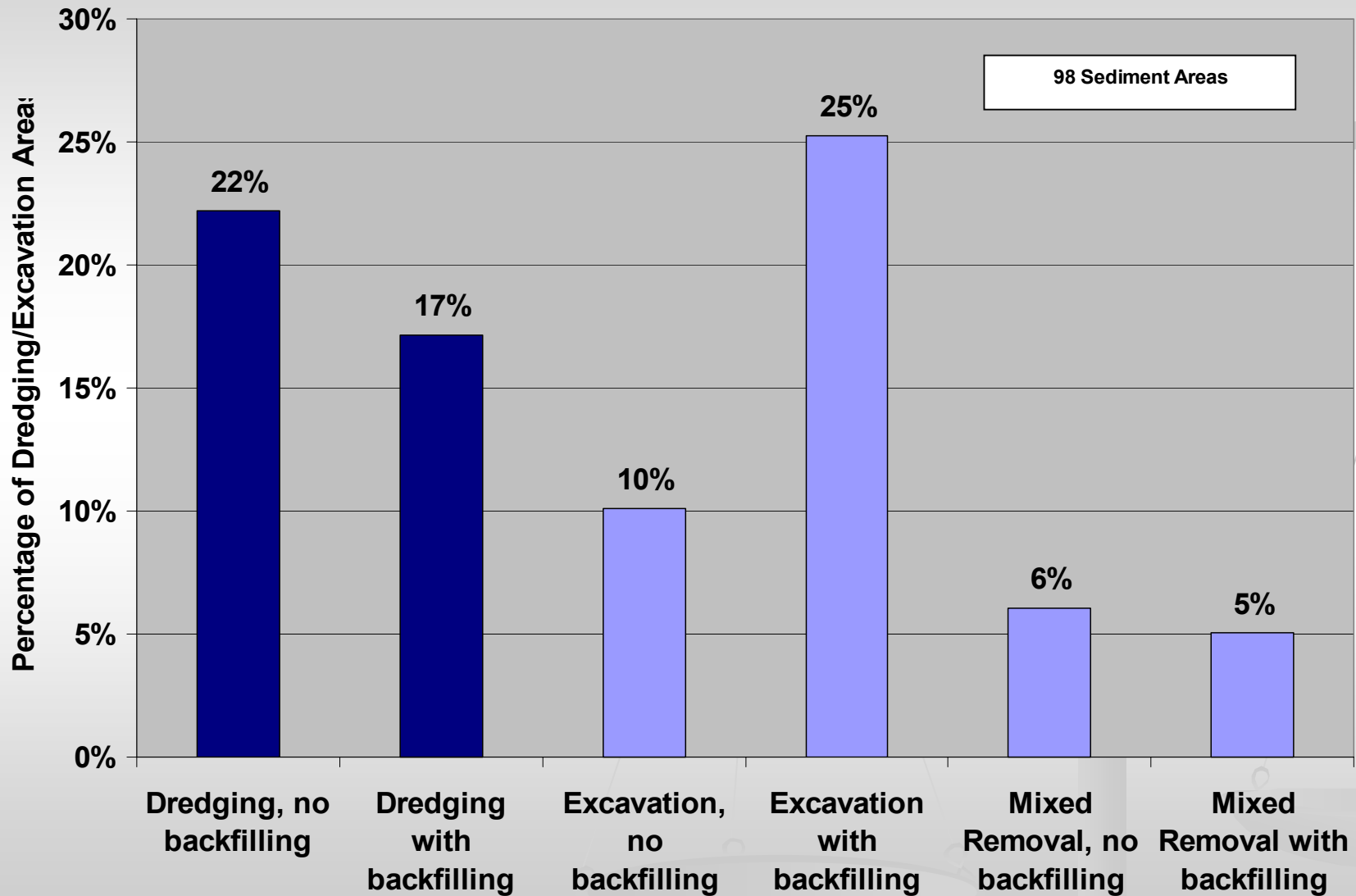
Cleanup Methods Around the Country



Remedies Selected



Dredging vs. Excavation



Superfund Dredging/Excavation Projects (example large sites)

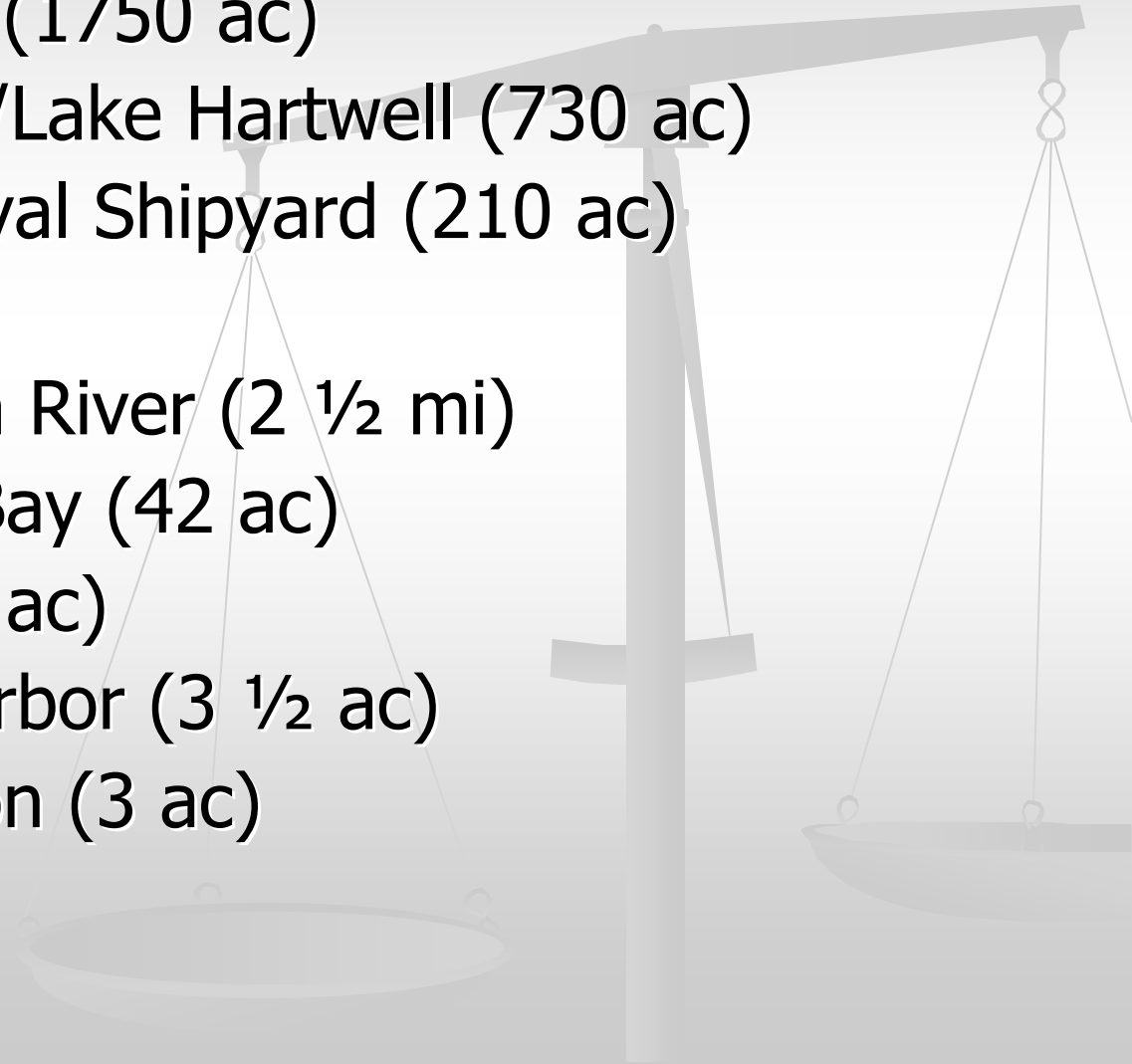
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- Hudson River
 - New Bedford Harbor
 - Fox River
 - Housatonic River (upper reaches)
 - Manistique River
 - Alcoa/Lavaca Bay
 - Bayou Bonfouca
 - United Heckathorn
 - Commencement Bay
 - Harbor Island
 - Puget Sound Naval Shipyard
 - Marathon Battery
 - Reynolds Metals
 - EI DuPont/Newport Pigment

Superfund Caps In Place (2003)

- Palos Verdes Shelf, CA - ~135 ac (pilot)
- Wyckoff/Eagle Harbor, WA – 65 ac
- CBNT/St. Paul Waterway, WA – 17 ac
- Old Navy/Manchester, WA – 5 ac
- Koppers/Charleston, SC – 4 ac
- GM Central Foundry, NY – 2 ac
- Puget Sound Naval, WA – 1 ac
- Bayou Bonfouca, LA – few ac (residuals)
- Reynolds Metals, NY - few ac (interim)
- ALCOA/Grasse River, NY – few ac (pilot)

Superfund MNR Decisions

- Alcoa/Lavaca Bay (1750 ac)
- Sangamo Weston/Lake Hartwell (730 ac)
- Puget Sound Naval Shipyard (210 ac)
- Fox River (6 mi.)
- Little Mississinewa River (2 ½ mi)
- Commencement Bay (42 ac)
- Burnt Fly Bog (21 ac)
- Wyckoff/Eagle Harbor (3 ½ ac)
- Koppers Charleston (3 ac)



Resources

- EPA OSWER Directive 9285.6-08: Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites (2/12/02, <http://www.epa.gov/superfund/resources/remedy/pdf/92-85608-s.pdf>)
- EPA Contaminated Sediment Web Page: <http://www.epa.gov/superfund/resources/sediment>
- EPA's National Remedy Review Board <http://www.epa.gov/superfund/programs/nrrb/>